

REMARKS:

In the foregoing amendments, claim 1 was amended by inserting the limitations of claim 5 therein. Claim 1 was further amended by defining that the multi-layered pipe is bent by causing the clamping die to revolve around the bending die while the inner pipe is *independently* pushed in the direction of the distal end of the inner pipe, along the lines described on page 12, lines 9-12, of the present specification disclosure. Namely, this portion of applicant's specification describes that the inner pipe is pushed in the distal direction (separately or independent) by the pushing means 10, while the clamping die 2 revolves around the bending die 1 so that the pipe 30 is bent. Claims 3-5, 8, 9, 11 and 12 were canceled. After the foregoing amendments, claims 1, 2, 6, 7 and 10 remain in the application for consideration by the examiner at this time. Early consideration and allowance of these claims are respectfully requested for the following reasons.

Applicant respectfully requests that the foregoing amendments be entered under the provisions of 37 C.F.R. §1.116 for the purposes of placing the application in condition for allowance or for the purposes of appeal. In the foregoing amendments, the limitations of a dependent claim (i.e., claim 5) were inserted into an independent claim (i.e., claim 1). In addition, claim 1 was amended to clarify that the multi-layered pipe is bent by causing the clamping die to revolve around the bending die while the inner pipe is *independently* pushed in the direction of the distal end of the inner pipe. These amendments are being made to clarify what was already implied in applicant's claims and these amendments are not narrowing amendments and are not being made for reasons substantially related to patentability presented. For all these reasons, applicant respectfully requests that the foregoing amendments to the claims

be entered under the provisions of 37 C.F.R. §1.116 for the purposes of placing the application in condition for allowance or for the purposes of appeal.

Claims 1, 2, 4, 6 and 8-11 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. patent No. 5,937,686 of Arai *et al.* (Arai '686) in view of JP 2001-269721 of Katayama and WO 01/83130 of Flehmig *et al.* (Flehmig). Claims 5, 7 and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Arai '686 in view of Katayama and Flehmig in further view of U.S. patent No. 3,859,839 of Crotti *et al.* (Crotti). These rejections are similar to those set forth in the previous Office action. Applicant respectfully submits that the presently claimed invention is patentably distinguishable from the teachings of Arai '686, Katayama, Flehmig and/or Crotti at least for the reasons set forth in the response filed on December 22, 2005, which are incorporated herein by reference. In addition, applicant respectfully submits the following.

Pages 4 and 5 of the Official action provided a response to applicant's arguments set forth in the response filed on December 22, 2005. These positions are set forth below:

(1) Applicants first argued that the teachings of Arai '686, Katayama, Flehmig and Crotti do not teach bending a pipe by causing the clamping die to revolve around the bending die while the inner pipe is pushed in the direction of the distal end of the inner pipe. In response, the Official action pointed out that such limitations are explicitly taught by Arai '686 in figure 2 and col. 4, lines 27-41.

(2) Applicants further argued that the above reference combination does not teach a specific material for the outside mandrel as required by claims 5, 7 and 12. In response, the Official action pointed out that Crotti clearly teaches the use of such material for a mandrel and therefore the combination would have been obvious to an artisan having ordinary skill in the art as stated above.

(3) Additionally, applicants argued that since Arai '686 and Katayama are concerned with bending a double-walled pipe while Flehmig is concerned with the bending of a single-walled pipe such a combination would not have been obvious. In response, the Official action pointed out that the nexus which links the inventions together is that they are all concerned with the bending of pipes and thus an artisan having ordinary skill in the

art would have looked to all of the above references and their respective teachings at the time of applicants' invention.

(4) With respect to the argument that the device of Flehmig would not be appropriate for bending a double-walled pipe, it was pointed out that the slits of Flehmig would in no way prevent the functionality of Arai '686 and would only improve it by allowing the tip to be bent with ease and therefore would have been obvious to one having ordinary skill in the art.

(5) In response to applicant's argument that they have a different reason for the slits in their mandrel, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

Concerning the aforesaid position (1), while the portion of Arai '686 noted in the Official action stated that the inner pipe 11 is also pushed in the same direction by the inner pipe keeping plate 83..., applicant respectfully submits that the operation or functioning proposed in Arai '686 is different than that of the present invention. Namely, in Arai '686 the inner pipe 11 is pulled together with the outer pipe 12. Applicant respectfully submits that this operation proposed by Arai '686 is fundamentally different than independently pushing the inner pipe 30a in the distal end direction by the pushing means 10, as discussed in applicant's specification disclosure on page 12, lines 9-12, and as required in present claim 1. Since the teachings of Arai '686 were used as a primary reference in all the rejections of the claims pending in this application, applicant respectfully submit that the inventions defined in the claims of this application are patentable over the teachings of Arai '686 alone or combined with other teachings. Therefore, applicant respectfully requests that the examiner reconsider and withdraw all the rejections of applicant's claims that were set forth in the outstanding Office action.

Concerning the aforesaid position (2), it is respectfully noted that the mandrel 1 in Crotti has a shape where the center plane B -- B of the mandrel 1 is wider than the ends of the mandrel

1. Accordingly, when inserted into the pipe, the center plane B – B lies at the bend and the shanks are bowed inwardly substantially to contact with one another so that the solid compressed width of the mandrel is approximately equal to the corresponding dimension of the tube.

Applicant respectfully submits that this structure and arrangement of the mandrel 1 proposed by Crotti would not function appropriately in a double-walled pipe bending to the which the presently claimed invention is directed.

For such reasons, applicant respectfully submits that one of ordinary skill in the art would not utilize the mandrel or materials therefor as proposed in Crotti in the device proposed by Arai '686. In addition, it is respectfully noted that in the device posed by Arai '686, the end portion of the mandrel extends a very small amount over the position L shown in the figures therein, while Crotti proposes that its mandrel extends completely through the bend. Those persons skilled in the art will understand that the functioning or materials for a mandrel extending completely through the bend as opposed to only partially extending into the bend are necessarily different, and therefore, would not substitute materials of one for the other with any reasonable expectation of success. For this reason, applicant respectfully submits that the teachings of Arai '686 and Crotti are not properly combinable and the rejections based thereon should be reconsidered and withdrawn.

Concerning the aforesaid positions (3)-(5), while the teachings of the cited references are all concerned with bending pipes, it is understood by those skilled in the art that the mechanics for bending a double-walled pipe are different from those for bending a single-walled pipe, and therefore, one of ordinary skill in the art would not substitute an isolated structure from a method and/or apparatus for bending a single-walled pipe into an apparatus and/or method for bending a double-walled pipe or *vice versa* with any reasonable expectation of success.

For example, the narrow space between the inner pipe and the outer pipe in a double-walled pipe causes serious difficulties during the bending thereof. This includes the fact that the tubular outer mandrel is bent under the condition that its inner surface contacts tightly with the outer surface of the inner pipe, and its outer surface contacts tightly with the inner surface of the outer pipe. Thus, the tubular outside mandrel suffers a large shear stress at the bending. In particular, the tubular outside mandrel is forced to deform within a very tight space, and those persons skilled in the art, especially art of bending a single-walled pipe, would not reasonably expect that such deformation is possible.

In case of a bending of a single-walled pipe, the mandrel inserted into the pipe contacts only with the inner surface of the pipe, as shown in the figures of Crotti. When the pipe is bent, the mandrel can easily deform, because free or empty space is available within the pipe. For example, in the arrangements proposed by Crotti, the mandrel can have a long slot, which allows the mandrel to deform easily. In the situation of bending single-walled pipes, it can be said that the design of a mandrel has a significant, or wide latitude of, freedom. This is also true for the selection of materials used for the mandrel. In the situation of a single-walled pipe, engineers can select any flexible synthetic resin, such as the polyethylene or nylon proposed by Crotti, as a material for the mandrel.

In contrast, when designing an outer mandrel for bending a double-walled pipe, the opposite is true in that there is no or limited design freedom. For example, it is very important to consider how to reduce the stress that will be caused by the deformation of the inner and outer pipes of the double-walled pipe. "Independent pushing of the inner pipe" that is set forth in applicant's claim 1 is a solution for this problem, which solution is not disclosed or suggested by any teachings cited against applicant's claims.

Furthermore, in this situation of a double-walled pipe, the outer mandrel that is deformed must be removed from the space while it is tightly compressed between the inner and outer pipes of the double-walled pipe. For this purpose, the material of the tubular outer mandrel must have a low friction factor and a high durability. Present claim 1 requires the use of one of an ultra high molecular weight polyethylene, MC nylon, or polyacetate, which materials have a lower friction factor and a higher durability than ordinary flexible synthetic resins, such as those proposed by Crotti. Due to the differences between bending a double-walled pipe versus bending a single-walled pipe, applicant respectfully submits that the teachings of Crotti could not possibly motivate one of ordinary skill in the art to the materials for the outer mandrel, as required in present claim 1. In other words, while the teachings of Crotti could possibly motivate one of ordinary skill in the art to make an appropriate selection of the material of the inner mandrel which can deform in the space provided in a single-walled pipe, such teachings could not disclose or suggest the selection of appropriate materials for the outer mandrel when bending a double-walled pipe. This is because, in part, materials appropriate for the outer mandrel an applicant's claims must undergo significant shear stress at the bending and at the removing thereof in a tight space, which requirements are not contemplated or suggested by the mandrel proposed in Crotti. In fact, no teachings cited against applicant's claims in the outstanding Office action provides any motivation or suggestion to one of ordinary skill in the art for an appropriate outer mandrel within the presently claimed invention. Therefore, applicant respectfully submits that this aspect of the invention as presently claimed is patently distinguishable from the teachings cited thereagainst.

Applicant respectfully submits that there is no sufficient nexus for combining the teachings cited against applicant's claims the manner set forth in the outstanding Office action.

While the teachings of Arai '686, Katayama, Flehming and Crotti may be concerned with the bending of a pipe, applicant respectfully submits that the bending of a pipe, *per se*, is not a sufficient nexus to combine these teachings. For example, it would be absurd, if someone would say that all the technologies of the bicycle and automobile belong to a same technical field because they are vehicles having two wheels; and consequently, any technology for an automobile cannot be patented, because such technology is suggested in the technology of bicycle and is no more than a technology improved for the solution of the problem unique to an automobile.

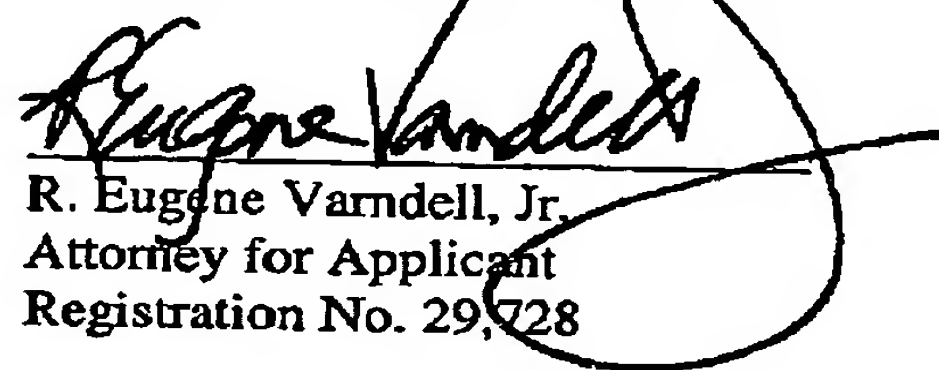
The teachings of Flehmig and Crotti are concerned with bending a single-walled pipe, while the teachings of Arai '686 and Katayama are concerned with bending a double-walled pipe. The above-discussed problems associated with the outer mandrel in a double-walled pipe bending do not appear in the bending of a single-walled pipe. Accordingly, applicant respectfully submits that one of ordinary skill in the art would not substitute an isolated teaching from Flehmig or Crotti into the teachings of Arai '686 or Katayama with any expectation of solving problems therein associated with bending double-walled pipes. Therefore applicant respectfully submits that the presently claimed invention cannot be obvious from such a combination of teachings.

For the foregoing reasons, applicant respectfully submits that the teachings of Arai '686, Katayama, Flehmig and/or Crotti, either alone or in combination, cannot contemplate or suggest the invention as set forth in claims 1, 2, 6, 7 and 10 within the meaning of 35 U.S.C. §103. Therefore, applicant respectfully requests that the examiner reconsider and withdraw the rejections of these claims, and formally allow claims 1, 2, 6, 7 and 10.

The foregoing is believed to be a complete and proper response to the Official action mailed March 14, 2006. While it is believed that all the claims in this application are in condition for allowance, should the examiner have any comments or questions, it is respectfully requested that the undersigned be telephoned at the below listed number to resolve any outstanding issues.

In the event this paper is not timely filed, applicant hereby petitions for an appropriate extension of time. The fee therefor, as well as any other fees which become due, may be charged to our deposit account No. 50-1147.

Respectfully submitted,
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